

REMARKS

Claims 1-14 have been withdrawn from this application in response to a restriction requirement in which claims 15-27 have been elected without traverse.

Claims 15, 18, 21 and 22 have been amended. Support for the amendment to claim 15 can be found, for example, in the specification at page 10, lines 16-20 and at page 8, lines 21-22. Support for the amendment to claim 18 can be found, for example, in the specification at page 8, lines 21-22, at page 10, lines 16-20 and at page 9, lines 11-13. The amendment to claim 21 simply places the claim into a format better suited for U.S. patent prosecution practice. The amendments to claim 22 and also to claims 15 and 18 further define Applicants' invention. No new matter has been introduced by any of the amendments.

I. REJECTION UNDER 35 USC § 112, second paragraph

a. Claims 18 and 21-22 are rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. Claims 19-20, 22, 24 and 25 are rejected for being dependent on claims 18 and 21. Specifically, the Examiner states that claim 21 is indefinite because it is unclear whether the sheet-like material is impregnated only once or is previously impregnated in claim 18. According to the Examiner, independent claim 18 does not state that the fiber-resistant material is impregnated by the polyimide binder and therefore, it is confusing as to if there are two impregnates and if the compositions of the impregnates are distinct.

Applicants have amended claim 18 to clarify the fact that a polyimide obtained from a water-soluble polyimide precursor is used as a binder resin for impregnating the heat-resistant fibers. The sheet-like material of claim 21 has at least two impregnates – the impregnate of the material of claim 18 (*i.e.* a polyimide obtained from a water-soluble polyimide precursor) and one or more impregnates of a heat-bonding polyimide. Applicants' specification states that the heat-bonding polyimide may be the same as or different from the polyimide obtained from a water-soluble polyimide precursor (see page 12, line 31 to page 13, line 14). In light of the amendments to claims 18 and 21, Applicants request that that this ground for the rejection be withdrawn.

b. Claim 22 is rejected as indefinite because the Examiner states that it is unclear what is required by the claim. According to the Examiner, it is not clear whether Applicants intend to recite Option 1 or Option 2 as described below.

Option 1: 1,3-bis(4-aminophenoxy)benzene or 1,3-bis(3-aminophenoxy)benzene and p-phenylenediamine and diaminophenylether or diaminophenylether;

Option 2: 1,3-bis(4-aminophenoxy)benzene or 1,3-bis(3-aminophenoxy)benzene and p-phenylenediamine or 1,3-bis(3-aminophenoxy)benzene and diaminophenylether

Applicants have amended claim 22 to encompass both Option 1 and Option 2. In light of this amendment, Applicants request that the rejection of claim 22 as indefinite be withdrawn.

II. REJECTION UNDER 35 U.S.C. § 102(e) / 103(a)

Claims 15-27 are rejected under 35 USC § 102(e) as anticipated by, or in the alternative, under 35 USC § 103(a) as obvious over US 2002/0106521 to Hashimoto *et al.* ("*Hashimoto*").

As to claims 15, 22 and 23, the Examiner asserts the following:

- 1) *Hashimoto* teaches a thermosetting low-dielectric polyimide resin composition comprising a tetracarboxylic acid dianhydride and diamine or diisocyanate, citing page 5, paragraph 44; and
- 2) *Hashimoto* teaches that a prepreg can be formed of a reinforcing fiber material impregnated with the resin composition which can serve as a binder for the heat-resistant fibers, citing page 7, paragraphs 65 and 62, respectively.

The Examiner states that Applicants' limitation in claim 15 of "obtained from a water-soluble polyimide precursor" has not been given patentable weight because the precursor used to form the polymer is not germane to the issue of patentability of the polymer or structure comprising the polymer itself provided that the chemical and physical limitations of the final polymer product are met.

As to claims 16 and 19, the Examiner asserts that *Hashimoto* teaches that the siloxane-modified polyimide resin composition has a glass transition temperature of at least 140° C, citing page 4, paragraph 37. According to the Examiner, it is known in the art that a glass transition temperature indicates the presence of at least a partially amorphous material.

As to claims 17, 20 and 22, the Examiner asserts that *Hashimoto* teaches a siloxane-modified polyimide resin composition comprising 2,3,3',4'-biphenyltetracarboxylic acid dianhydride as the tetracarboxylic acid dianhydride component, citing page 5, paragraphs 44 and 47. The Examiner states that *Hashimoto* does not suggest the combination of two or more tetracarboxylic acid dianhydride materials, and therefore, she assumes that in one embodiment, 100% of the tetracarboxylic acid dianhydride component comprises 2,3,3',4'-biphenyltetracarboxylic acid dianhydride and 0% comprises 3,3',4,4'-biphenyltetracarboxylic dianhydride. For claim 22, specifically, the Examiner states that because *Hashimoto* does not suggest the combination of two or more diamine materials, she assumes that in one embodiment, 100% of the diamine component comprises 1,3-bis[1-(4-aminophenyl)-1-methphenyl]benzene.

As to claim 18, the Examiner asserts the following:

- 1) *Hashimoto* teaches a thermosetting low-dielectric polyimide resin composition comprising a tetracarboxylic acid dianhydride and diamine or diisocyanate, citing page 5, paragraph 44;
- 2) *Hashimoto* teaches that siloxane-modified polyimide resin composition can additionally contain a reaction promoter comprising 1,2-dimethylimidazole or 1-methyl-2-ethylimidazole, citing page 7, paragraph 62; and
- 3) *Hashimoto* teaches that a prepreg can be formed of a reinforcing fiber material impregnated with the resin composition which can serve as a binder for the heat-resistant fibers, citing page 7, paragraphs 65 and 62, respectively.

As to claim 21, the Examiner asserts that *Hashimoto* teaches that a prepreg can be formed of a reinforcing fiber material impregnated with the resin composition which can serve as a heat-bonding polyimide. The Examiner states that she views the polyimide which serves as a binder for heat-resistant fibers and the polyimide which serves as a heat-bonding polyimide as the same impregnate because it meets the physical and chemical limitations set forth by Applicants.

As to claims 24-27, the Examiner asserts that *Hashimoto* teaches a metal film, specifically a copper film, can be applied to the resin surface, citing page 8, paragraph 73.

As to claims 15 and 23, the Examiner asserts that although *Hashimoto* does not explicitly teach the recited "which retains at least 70% of its tensile strength even which left in an environment at 200° C for one hour" of claim 15 or the "thermal decomposition temperature of

500° C or higher and a breaking elongation of 15% or greater when shaped into a film” of claim 23, these limitations are inherent in the invention of *Hashimoto*.

Applicants disagree with the Examiner’s assessment of the applicability of *Hashimoto* to Applicants’ invention. *Hashimoto* is limited to **siloxane-modified** polyimides. Applicants do not teach or suggest such modified polyimides. Applicants also disagree with the Examiner not giving “patentable weight” to the limitation of “obtained from a water-soluble polyimide precursor.” The Examiner states that “the precursor used to form the polymer is not germane to the issue of patentability of the polymer.” Applicants argue that by limiting the polyimide of claim 15 specifically to polyimides that are obtained from water-soluble polyimide precursors, Applicants are **excluding** all polyimides that are obtained from polyimide precursors that are water-**insoluble**. Therefore, the requirement that the polyimide precursors are water soluble is germane to the patentability of the polyimides formed thereof. In fact, this water-soluble feature of the polyimide precursors contributes to the novelty of Applicants’ invention.

The Examiner’s comments pertaining to each claim are addressed below:

Claims 15, 22 and 23: The Examiner cites page 5, paragraph 44 as teaching the polyimide of which the claimed fiber-impregnated material is comprised. This paragraph in the *Hashimoto* specification actually distinguishes the siloxane-modified polyimides of the *Hashimoto* invention from non-siloxane containing polyimides such as those of Applicants’ invention. “The siloxane-modified polyimide used in the present invention can be prepared by a general method used for producing a polyimide.” Even *Hashimoto*’s use of the term “modified” indicates that the basic polyimide structure has been altered in some respect. Applicants do not teach or suggest siloxane-modified polyimides. The Examiner cites page 7, paragraph 62 as teaching a reinforcing fiber material impregnated with a resin composition. *Hashimoto* does indeed disclose “a reinforcing fiber material impregnated with the **above** resin composition...” The “above” resin composition is the siloxane-modified polyimide discussed above, that is very different from the polyimides of Applicants’ invention. The Examiner cites page 7, paragraph 62 as teaching that the resin composition can serve as a binder for heat-resistant fibers. Paragraph 62 merely discloses a list of exemplary “reaction promoters” that serve to promote “a reaction during drying or curing with

heat.” Nothing in paragraph 62 teaches or suggests the use of Applicants’ polyimide as a binder resin for heat-resistant fibers.

Claims 16 and 19: The Examiner cites page 4, paragraph 37 of *Hashimoto* as teaching that the siloxane-modified polyimide resins of *Hashimoto* preferably have a glass transition temperature of 140° C or more. The Examiner states that it is known in the art that a glass transition temperature indicates the presence of at least a partially amorphous material. Paragraph 37 of *Hashimoto* discloses that the siloxane-modified polyimides of *Hashimoto* have a glass transition temperature of 150° C or less. In contrast, Applicants’ claims 15 and 18, as amended, recite a polyimide with a glass transition temperature of 190-350° C. Therefore, the siloxane-modified polyimides of *Hashimoto* are at the very least distinguished from the polyimides of Applicants’ invention by (a) the fact that *Hashimoto*’s polyimides are siloxane-modified and (b) the fact that there is a 40° C difference between the highest glass transition temperature preferred by *Hashimoto* for its siloxane-modified polyimides and the lowest glass transition temperature allowed by Applicants for the polyimide of claim 16.

Claims 17, 20 and 22: The Examiner cites page 5, paragraphs 44 and 47 of *Hashimoto* as teaching 2,3,3’,4’-biphenyltetracarboxylic acid dianhydride as the tetracarboxylic acid component. These paragraphs of *Hashimoto* teach that the siloxane-modified polyimides of the invention can be produced from a tetracarboxylic acid dianhydride component, such as the exemplified 2,3,3’,4’-biphenyltetracarboxylic acid dianhydride. As discussed above, the polyimides of Applicants’ invention can be readily distinguished from the siloxane-modified polyimides of *Hashimoto* in that Applicants’ polyimides are not siloxane-modified. Page 4, paragraph 35 of *Hashimoto* discloses that “the siloxane-modified polyimide used in the present invention structurally contains siloxane, and the modification ratio of the polyimide with siloxane is 1 to 60 mol %.” One of skill in the art would not associate the term “polyimide,” without further modification, as containing siloxane groups. *Hashimoto* confirms this idea by the use of the phrase “siloxane-modified” polyimides. As such, *Hashimoto* does not anticipate or teach Applicants’ polyimides.

Claim 18: The Examiner cites page 7, paragraph 62 as teaching the use of 1,2-dimethylimidazole or 1-methyl-2-ethylimidazole as a reaction promoter. This paragraph does disclose that the resin composition of *Hashimoto* “may contain a reaction promoter as required for promoting a reaction during drying or curing under heat.” However, as discussed above, *Hashimoto* discloses that the siloxane-modified polyimides of the invention have a glass transition temperature of 150° C or less. In contrast, Applicants’ polyimides are not siloxane-modified and claim 18, as amended, recites that the polyimide has a glass transition temperature of 190-350° C, which is not taught or suggested by *Hashimoto*. For at least these reasons, *Hashimoto* does not anticipate or suggest Applicants’ polyimides of claim 18.

Claims 24-27: The Examiner cites page 8, paragraph 73 of *Hashimoto* as teaching that a metal film, specifically a copper film, can be applied to the resin surface. The laminated resin composition that is described in this paragraph of the *Hashimoto* specification contains a siloxane-modified polyimide component as disclosed at page 2, paragraph 15. Applicants’ laminate, in contrast, contains a polyimide component that is not siloxane-modified. *Hashimoto* does not teach or suggest the lamination of polyimides that are not siloxane-modified.

Applicants believe that the above-discussed rebuttals to the Examiner’s rejection of claims 15-27 under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over *Hashimoto* demonstrate that *Hashimoto* neither teaches or suggests the subject matter of Applicants’ claims 15-27, as amended. Applicants therefore request that this rejection be withdrawn.

III. CONCLUSION

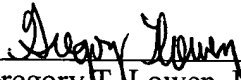
Applicants respectfully request reconsideration of the subject application in view of the above amendments and remarks. The subject application is now in condition for allowance and early notice to that effect is respectfully solicited. Should the Examiner feel that there are any issues outstanding after consideration of this amendment, the Examiner is invited to contact Applicants’ undersigned representative to expedite prosecution.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or to credit any overpayment to Deposit Account 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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